# GAITHERSBURG GREEN BUILDING PROGRAM
# LEED™ 2.1 REQUIREMENTS

## SUSTAINABLE SITES (14 Possible Points)

**Erosion & Sedimentation Control:** Design a sediment and erosion control plan, specific to the site, that conforms to United States Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005 (September 1992), Storm Water Management for Construction Activities, Chapter 3, OR local erosion and sedimentation control standards and codes, whichever is more stringent. The plan shall meet the following objectives:

Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
Prevent sedimentation of storm sewer or receiving streams.
Prevent polluting the air with dust and particulate matter.

**Site Selection:** Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria:

Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5).
Land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA).
Land which is specifically identified as habitat for any species on Federal or State threatened or endangered lists.
Within 100 feet of any water including wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR greater than distances given in state or local regulations as defined by local or state rule or law, whichever is more stringent.
Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt).

**Urban Redevelopment:** Increase localized density to conform to existing or desired density goals by utilizing sites that are located within an existing minimum development density of 60,000 square feet per acre (two story downtown development).

**Brownfield Redevelopment:** Develop on a site documented as contaminated (by means of an ASTM E1903- 97 Phase II Environmental Site Assessment) OR on a site classified as a Brownfield by a local, state or federal government agency. Effectively remediate site contamination.

**Alternative Transportation (Public Transportation Access):** Locate project within 1/2 mile of a commuter rail, light rail or subway station or 1/4 mile of two or more public or campus bus lines usable by building occupants.

**Alternative Transportation (Bicycle Storage & Changing Rooms):** For commercial or institutional buildings, provide secure bicycle storage with convenient changing/shower facilities (within 200 yards of the building) for 5% or more of regular building occupants. For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants in lieu of changing/shower facilities.

**Alternative Transportation (Alternative Fuel Vehicles):** Provide alternative fuel vehicles for 3% of building occupants AND provide preferred parking for these vehicles, OR install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors.

**Alternative Transportation (Parking Capacity):** Size parking capacity to meet, but not exceed, minimum local zoning requirements AND provide preferred parking for carpools or vanpools capable of serving 5% of the building occupants; OR add no new parking for rehabilitation projects AND provide preferred parking for carpools or vanpools capable of serving 5% of the building occupants.

**Reduced Site Disturbance (Protect or Restore Open Space):** On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 5 feet beyond primary roadway curbs, walkways and main utility branch trenches, and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area; OR, on previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation.

**Reduced Site Disturbance (Development Footprint):** Reduce the development footprint (defined as entire building footprint, access roads and parking) to exceed the local zoning's open space requirement for the site by 25%. For areas with no local zoning requirements (e.g., some university campuses and military bases), designate open space area adjacent to the building that is equal to the development footprint.

**Stormwater Management (Rate and Quantity):** If existing imperviousness is less than or equal to 50%, implement a stormwater management plan that prevents the post-development 1.5 year, 24 hour peak discharge rate from exceeding the pre-development 1.5 year, 24 hour peak discharge rate. OR. If existing imperviousness is greater than 50%, implement a stormwater management plan that results in a 25% decrease in the rate and quantity of stormwater runoff.

**Stormwater Management (Treatment):** Construct site stormwater treatment systems designed to remove 80% of the average annual post-development total suspended solids (TSS) and 40% of the average annual post-development total phosphorous (TP) based on the average annual loadings from all storms less than or equal to the 2-year/24- hour storm. Do so by implementing Best Management Practices (BMPs) outlined in Chapter 4, Part 2 (Urban Runoff ), of the United States Environmental Protection Agency's (EPA's) *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, January 1993 (Document No. EPA-840-B-92- 002) or the local government's BMP document (whichever is more stringent).

**Heat Island Effect (Non-Roof):** Provide shade (within 5 years) and/or use light-colored/high-albedo materials (reflectance of at least 0.3) and/or open grid pavement for at least 30% of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, etc.; OR place a minimum of 50% of parking spaces underground or covered by structured parking; OR use an open-grid pavement system (less than 50% impervious) for a minimum of 50% of the parking lot area.

**Heat Island Effect (Roof):** Use ENERGY STAR® compliant (highly reflective) AND high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) for a minimum of 75% of the roof surface; OR install a "green" (vegetated) roof for at least 50% of the roof area. Combinations of high albedo and vegetated roof can be used providing they collectively cover 75% of the roof area.

**Light Pollution Reduction:** Meet or provide lower light levels and uniformity ratios than those recommended by the Illuminating Engineering Society of North America (IESNA) *Recommended Practice Manual: Lighting for Exterior Environments* (RP-33-99). Design exterior lighting such that all exterior luminaires with more than 1000 initial lamp lumens are shielded and all luminaires with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification. The maximum candela value of all interior lighting shall fall within the building (not out through windows) and the maximum candela value of all exterior lighting shall fall within the property. Any luminaire within a distance of 2.5 times its mounting height from the property boundary shall have shielding such that no light from that luminaire crosses the property boundary.

## WATER EFFICIENCY (5 Possible Points)

**Water Efficient Landscaping (Reduce by 50%):** Use high-efficiency irrigation technology OR use captured rain or recycled site water to reduce potable water consumption for irrigation by 50% over conventional means.

**Water Efficient Landscaping (No Potable Use or No Irrigation):** Use only captured rain or recycled site water to eliminate all potable water use for site irrigation (except for initial watering to establish plants), OR do not install permanent landscape irrigation systems.

**Innovative Wastewater Technologies:** Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50%, OR treat 100% of wastewater on site to tertiary standards.

**Water Use Reduction (20% Reduction):** Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.

**Water Use Reduction (30% Reduction):** Employ strategies that in aggregate use 30% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.

## INNOVATION AND DESIGN (5 Possible Points)

**Innovation and Design:** This category provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED Green Building Rating System. In writing, identify the **intent** of the proposed innovation credit, the proposed **requirement** for compliance, the proposed **submittals** to demonstrate compliance, and the **design approach** (strategies) that might be used to meet the requirements.

**LEED™ Accredited Professional:** At least one principal participant of the project team that has successfully completed the LEED Accredited Professional exam

## ENERGY AND ATMOSPHERE (17 Possible Points)

**Fundamental Building Systems Commissioning**

- ? Implement or have a contract in place to implement the following fundamental best practice commissioning procedures.
- ? Engage a commissioning team that does not include individuals directly responsible for project design or construction management.
- ? Review the design intent and the basis of design documentation.
- ? Incorporate commissioning requirements into the construction documents.
- ? Develop and utilize a commissioning plan.
- ? Verify installation, functional performance, training and operation and maintenance documentation.
- ? Complete a commissioning report.

**Minimum Energy Performance:** Design the building to comply with ASHRAE/IESNA Standard 90.1-1999 (without amendments) or the local energy code, whichever is more stringent.

**CFC Reduction in HVAC&R Equipment:** Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion.

**Optimize Energy Performance (1-10 POINTS):** Reduce design energy cost compared to the energy cost budget for energy systems regulated by ASHRAE/IESNA Standard 90.1-1999 (without amendments), as demonstrated by a whole building simulation using the Energy Cost Budget Method described in Section 11 of the Standard.

| New Bldgs. | Existing Bldgs. | Points |
|---|---|---|
| 15% | 5% | 1 |
| 20% | 10% | 2 |
| 25% | 15% | 3 |
| 30% | 20% | 4 |
| 35% | 25% | 5 |
| 40% | 30% | 6 |
| 45% | 35% | 7 |
| 50% | 40% | 8 |
| 55% | 45% | 9 |
| 60% | 50% | 10 |

Regulated energy systems include HVAC (heating, cooling, fans and pumps), service hot water and interior lighting. Non-regulated systems include plug loads, exterior lighting, garage ventilation and elevators (vertical transportation). Two methods may be used to separate energy consumption for regulated systems. The energy consumption for each fuel may be prorated according to the fraction of energy used by regulated and non-regulated energy. Alternatively, separate meters (accounting) may be created in the energy simulation program for regulated and non-regulated energy uses. If an analysis has been made comparing the proposed design to local energy standards and a defensible equivalency (at minimum) to ASHRAE/IESNA Standard 90.1-1999 has been established, then the comparison against the local code may be used in lieu of the ASHRAE Standard. Project teams are encouraged to apply for innovation credits if the energy consumption of non-regulated systems is also reduced.

**Renewable Energy (5%):** Supply at least 5% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

**Renewable Energy (10%):** Supply at least 10% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

**Renewable Energy (20%):** Supply at least 20% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

**Additional Commissioning:** In addition to the Fundamental Building Commissioning prerequisite, implement or have a contract in place to implement the following additional commissioning tasks:

1. A commissioning authority independent of the design team shall conduct a review of the design prior to the construction documents phase.
1. An independent commissioning authority shall conduct a review of the construction documents near completion of the construction document development and prior to issuing the contract documents for construction.
2. An independent commissioning authority shall review the contractor submittals relative to systems being commissioned.
3. Provide the owner with a single manual that contains the information required for re-commissioning building systems.
4. Have a contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date.

**Ozone Protection:** Install base building level HVAC and refrigeration equipment and fire suppression systems that do not contain HCFCs or Halons.

**Measurement and Verification:** Install continuous metering equipment for the following end-uses:

- Lighting systems and controls
- Constant and variable motor loads
- Variable frequency drive (VFD) operation
- Chiller efficiency at variable loads (kW/ton)
- Cooling load
- Air and water economizer and heat recovery cycles
- Air distribution static pressures and ventilation air volumes
- Boiler efficiencies
- Building-related process energy systems and equipment
- Indoor water risers and outdoor irrigation systems

Develop a Measurement and Verification plan that incorporates the monitoring information from the above end-uses and is consistent with Option B, C or D of the 2001 *International Performance Measurement & Verification Protocol (IPMVP) Volume I: Concepts and Options for Determining Energy and Water Savings.*

**Green Power:** Provide at least 50% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements. Provide at least 50% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements.

## MATERIALS AND RESOURCES (13 Possible Points)

**Storage & Collection of Recyclables:** Provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

**Building Reuse (Maintain 75% of Existing Walls, Floors and Roof):** Maintain at least 75% of existing building structure and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material).

**Building Reuse (Maintain 100% of Existing Walls, Floors and Roof):** Maintain an additional 25% (100% total) of existing building structure and shell (exterior skin and framing, excluding window assemblies and nonstructural roofing material).

**Building Reuse (Maintain 100% of Shell/Structure and 50% of Non-Shell/Non-Structure):** Maintain 100% of existing building structure and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material) AND at least 50% of non-shell areas (interior walls, doors, floor coverings and ceiling systems).

**Construction Waste Management (Divert 50% From Landfill):** Develop and implement a waste management plan, quantifying material diversion goals. Recycle and/or salvage at least 50% of construction, demolition and land clearing waste. Calculations can be done by weight or volume, but must be consistent throughout.

**Construction Waste Management (Divert 75% From Landfill):** Develop and implement a waste management plan, quantifying material diversion goals. Recycle and/or salvage an additional 25% (75% total) of construction, demolition and land clearing waste. Calculations can be done byweight or volume, but must be consistent throughout.

**Resource Reuse (5%):** Use salvaged, refurbished or reused materials, products and furnishings for at least 5% of building materials.

**Resource Reuse (10%):** Use salvaged, refurbished or reused materials, products and furnishings for at least 10% of building materials.

**Recycled Content (5%, post-consumer + 1/2 post-industrial):** Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 5% of the total value of the materials in the project. The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item. Mechanical and electrical components shall not be included in this calculation.
Recycled content materials shall be defined in accordance with the Federal Trade Commission document, *Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e)*, available at www.ftc.gov/bcp/grnrule/guides980427.htm.

**Recycled Content (10%, post-consumer + 1/2 post-industrial):** Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 10% of the total value of the materials in the project. The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item. Mechanical and electrical components shall not be included in this calculation. Recycled content materials shall be defined in accordance with the Federal Trade Commission document, *Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e)*, available at www.ftc.gov/bcp/grnrule/guides980427.htm.

**Regional Materials (20% manufactured regionally):** Use a minimum of 20% of building materials and products that are manufactured* regionally within a radius of 500 miles.

* Manufacturing refers to the final assembly of components into the building product that is furnished and installed by the tradesmen. For example, if the hardware comes from Dallas, Texas, the lumber from Vancouver, British Columbia, and the joist is assembled in Kent, Washington; then the location of the final assembly is Kent, Washington.

**Regional Materials (50% extracted regionally):** Of the regionally manufactured materials documented for MR Credit 5.1, use a minimum of 50% of building materials and products that are extracted, harvested or recovered (as well as manufactured) within 500 miles of the project site.

**Rapidly Renewable Materials:** Use rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle or shorter) for 5% of the total value of all building materials and products used in the project.

**Certified Wood:** Use a minimum of 50% of wood-based materials and products, certified in accordance with the Forest Stewardship Council's Principles and Criteria, for wood building components including, but not limited to, structural framing and general dimensional framing, flooring, finishes, furnishings, and nonrented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

## INDOOR ENVIRONMENTAL QUALITY (15 Possible Points)

**Minimum IAQ Performance:** Meet the minimum requirements of voluntary consensus standard ASHRAE 62-1999, Ventilation for Acceptable Indoor Air Quality, and approved Addenda (see ASHRAE 62-2001, Appendix H, for a complete compilation of Addenda) using the Ventilation Rate Procedure.

**Environmental Tobacco Smoke (ETS) Control:** Zero exposure of non-smokers to ETS by EITHER:

- Prohibiting smoking in the building and locating any exterior designated smoking areas away from entries and operable windows; OR
- Providing a designated smoking room designed to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no recirculation of ETS-containing air to the non-smoking area of the building, enclosed with impermeable deck-to-deck partitions and operated at a negative pressure compared with the surrounding spaces of at least 7 PA (0.03 inches of water gauge).
- Performance of the smoking rooms shall be verified by using tracer gas testing methods as described in the ASHRAE Standard 129-1997. Acceptable exposure in non-smoking areas is defined as less than 1% of the tracer gas concentration in the smoking room detectable in the adjoining non-smoking areas. Smoking room testing as described in ASHRAE Standard 129-1997 is required in the contract documents and critical smoking facility systems testing results must be included in the building commissioning plan and report or as a separate document.

**Carbon Dioxide (CO2) Monitoring:** Install a permanent carbon dioxide (CO2) monitoring system that provides feedback on space ventilation performance in a form that affords operational adjustments. Refer to the CO2 differential for all types of occupancy in accordance with ASHRAE 62-2001, Appendix D.

**Ventilation Effectiveness:** For mechanically ventilated buildings, design ventilation systems that result in an air change effectiveness (Eac) greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.

**Construction IAQ Management Plan (During Construction):** Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3.
- Protect stored on-site or installed absorptive materials from moisture damage.
- If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.
- Replace all filtration media immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.

**Construction IAQ Management Plan (Before Occupancy):** Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase as follows:

- After construction ends and prior to occupancy conduct a minimum two-week building flush-out with new Minimum Efficiency Reporting Value (MERV) 13 filtration media at 100% outside air. After the flushout, replace the filtration media with new MERV 13 filtration media, except the filters solely processing outside air. OR
- Conduct a baseline indoor air quality testing procedure consistent with the United States Environmental Protection Agency's current Protocol for Environmental Requirements, Baseline IAQ and Materials, for the Research Triangle Park Campus, Section 01445.

**Low-Emitting Materials (Adhesives & Sealants):** The VOC content of adhesives and sealants used must be less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

**Low-Emitting Materials (Paints and Coatings):** VOC emissions from paints and coatings must not exceed the VOC and chemical component limits of Green Seal's Standard GS-11 requirements.

**Low-Emitting Materials (Carpet):** Carpet systems must meet or exceed the requirements of the Carpet and Rug Institute's Green Label Indoor Air Quality Test Program.

**Low-Emitting Materials (Composite Wood):** Composite wood and agrifiber products must contain no added urea-formaldehyde resins.

**Indoor Chemical & Pollutant Source Control**: Design to minimize pollutant cross-contamination of regularly occupied areas:

- Employ permanent entryway systems (grills, grates, etc.) to capture dirt, particulates, etc. from entering the building at all high volume entryways.
- Where chemical use occurs (including housekeeping areas and copying/ printing rooms), provide segregated areas with deck to deck partitions with separate outside exhaust at a rate of at least 0.50 cubic feet per minute per square foot, no air re-circulation and maintaining a negative pressure of at least 7 PA (0.03 inches of water gauge).
- Provide drains plumbed for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.

**Controllability of Systems (Perimeter Spaces):** Provide at least an average of one operable window and one lighting control zone per 200 square feet for all regularly occupied areas within 15 feet of the perimeter wall.

**Controllability of Systems (Non-Perimeter Spaces):** Provide controls for each individual for airflow, temperature and lighting for at least 50% of the occupants in non-perimeter, regularly occupied areas.

**Thermal Comfort (Compliance with ASHRAE 55-1992):** Comply with ASHRAE Standard 55-1992, Addenda 1995, for thermal comfort standards including humidity control within established ranges per climate zone. For naturally ventilated buildings, utilize the adaptive comfort temperature boundaries, using the 90% acceptability limits as defined in the California High Performance Schools (CHPS) Best Practices Manual, Appendix C – A Field Based Thermal Comfort Standard for Naturally Ventilated Buildings, Figure 2.

**Thermal Comfort (Permanent Monitoring System):** Install a permanent temperature and humidity monitoring system configured to provide operators control over thermal comfort performance and the effectiveness of humidification and/or dehumidification systems in the building.

**Daylight and Views (Daylight 75% of Spaces):** Achieve a minimum Daylight Factor of 2% (excluding all direct sunlight penetration) in 75% of all space occupied for critical visual tasks. Spaces excluded from this requirement include copy rooms, storage areas, mechanical plant rooms, laundry and other low occupancy support areas. Other exceptions for spaces where tasks would be hindered by the use of daylight will be considered on their merits.

**Daylight and Views (Views for 90% of Spaces):** Achieve direct line of sight to vision glazing for building occupants in 90% of all regularly occupied spaces. Examples of exceptions include copy rooms, storage areas, mechanical, laundry and other low occupancy support areas. Other exceptions will be considered on their merits.